VI.—This storm apparently had its origin to the north of Montana on the 19th. It moved eastward as an extended depression, covering the Rocky Mountain regions, two depressions forming in the barometric trough which covered the eastern slope of the Rocky Mountains on the 20th. The more northerly of these depressions, which was central over Manitoba on the 20th, developed but slight energy and could not be traced farther eastward than Lake Superior, where it was approximately located on the 21st. The southern disturbance first observed over western Nebraska moved directly southward to southern Texas during the 20th and 21st, after which it apparently moved to the east of the coast line and changed direction to the northeast, moving very slowly over Louisiana and Mississippi from the 22d to the 25th, developing but slight energy, but attended by heavy rains generally throughout the Southern States. The rain area extended northward over the Lake region and middle Atlantic states on the 25th, when a secondary disturbance formed over Illinois in the northern extremity of the barometric trough which attended this disturbance. This secondary disturbance passed eastward over the lower lake region and thence to the middle Atlantic coast, where it was central the afternoon of the 26th, and the succeeding report indicates that this storm increased in energy and moved northeastward along the Nova Scotia coast during the 27th.

VII.—At the close of the month this depression was central north of North Dakota, though the previous reports indicate that it existed in the region far to the north of Montana as early as the 27th.

NORTH ATLANTIC STORMS FOR SEPTEMBER, 1890 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the storms that appeared over the north Atlantic ocean during September, 1890, are shown on chart I. These paths have been determined from international observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Seven storms have been traced for September, 1890, the average number for the corresponding month of the last 7 years being 9. Of the storms traced for the current month 3 were continuations of low pressure areas which first appeared over the North American continent; one was a continuation of a West India cyclone which advanced from east of the Windward Islands to west of Bermuda and thence northeastward to the Banks of Newfoundland during the last 5 days of August; two apparently developed over mid-ocean; and one first appeared southwest of the British Isles. The storms generally pursued normal east to northeast paths, and no storm traversed the ocean from coast to coast.

The month opened with the West India cyclone referred to central off the southeast extremity of Newfoundland, with pressure about 29.00 (737) and gales of hurricane force. By the 2d this storm had advanced to off the southern extremity of Greenland, after which it disappeared over mid-ocean in high latitudes. On the 4th, at 1.30 p. m., a telegram was received from Havana, Cuba, stating that a cyclonic disturbance was south of that place, moving westward. At 3 p. m., 5th, a telegram from Havana stated that a cyclonic disturbance was south of that station, and on the 6th, at 8.45 a. m., stating that a disturbance to the southwest was crossing Yucatan and probably moving w. by n. On the 7th a storm, which was a continuation of a low pressure area which moved eastward over the Gulf of Saint Lawrence, was central on the east edge of the Banks of Newfoundland, where it remained nearly stationary until the 10th, after which it passed northeastward and disappeared in the direction of Iceland after the 12th, attended during the 11th and 12th by fresh to strong gales. From the 8th to 10th the advance of this storm was apparently checked by high pressure to the eastward. On the 12th, at 1.47 p. m., a telegram was received from Havana stating that the upper currents gave some indication of a cyclone to the northeast. On the 14th the barometer was below 29.60 (752) over mid-ocean in high latitudes. During the 15th and 16th the pressure was about 29.00 (737) wnw. of Ireland, and the pressure continued low in that region during the 17th. On the 16th a storm was central on the south New England coast, where it continued nearly stationary during the 17th, its advance being apparently checked by high pressure to the eastward, and during the 18th and 19th it advanced northeastward over the Gulf of Saint Lawrence and disappeared north of Newfoundland. On the 18th the barometer was high over mid-ocean in high latitudes, and a storm was apparently developing between the 30th and 40th parallels. On the 19th a storm was central southwest of Ireland, with pressure below 29.40 (747) and fresh gales, whence it moved slowly east of north and disappeared north of the British Isles during the 22d, attended by heavy gales and pressure falling below 29.00 (737) on the 20th. On the 21st a storm was central over the Gulf of Saint Lawrence, whence it apparently moved rapidly northeastward over Newfoundland and disappeared north of the region of observation near the 20th meridian after the 24th, with strong gales and pressure below 29.30 (744) on the 23d. During the 23d a storm moved eastward over the Canadian Maritime Provinces and on the 24th was central off the east coast of Newfoundland, with pressure below 29.70 (754) and strong gales, after which it moved northeast beyond the region of observation. On the 27th a storm of considerable strength moved eastward over Nova Scotia, and on the 28th a storm of moderate energy was central east of Nova Scotia. During the 29th and 30th a storm advanced eastward over mid-ocean in high latitudes and disappeared north of the British Isles. On the 30th a storm of marked energy, with pressure below 29.40 (747), at noon, Greenwich time, and heavy gales, was central over the Banks of Newfoundland.

Well-defined and destructive September cyclones have averaged about one per year over the West Indies, their usual path being westward from or near the Windward Islands to the Gulf of Mexico, where they recurve northward. Among notable West India cyclones charted and described in the REVIEW are: 1882, storm appeared north of San Domingo on the 2d and moved westward over Cuba to the central Gulf, where it recurved to the Alabama coast by the night of the 9th, following the usual parabolic path. 1883, storm moved from off the eastern extremity of Cuba on the 6th northwestward over the Bahamas to the North Carolina coast by the 11th. 1886, storm off the west Gulf coast moved northward to the middle Texas coast from the 22d to 24th. 1887, one storm advanced from east of the Windward Islands on the 11th westward over the Caribbean Sea and north of west over the Gulf of Mexico to the Texas coast by the 21st, and one moved northeast from the western extremity of Cuba over the Bahamas. 1888, one storm moved from north of Puerto Rico on the 1st westward over Cuba and Yucatan to the Mexican coast near Vera Cruz by the 7th, a very unusual course, and one passed from the Bahamas westward over southern Florida, where it recurved northward during the 8th and 9th. 1889, a storm advanced from the Windward Islands to the middle Atlantic coast from the 3d to 12th; a storm moved westward over the Caribbean Sea from the 13th to 17th, and thence apparently passed over Yucatan and recurved to the north-central coast of the Gulf of Mexico by the 22d; a storm northeast of the Windward Islands on the 4th and 5th recurved northeast and disappeared north of the Azores after the 11th.

FOG IN SEPTEMBER.

The limits of fog-belts west of the 40th meridian, as determined from reports of shipmasters, are shown on chart I by

dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on 15 dates; between the 55th and 65th meridians on 4 dates; and west of the 65th meridian on 1 date. Compared with the corresponding month of the last 2 years the dates of occurrence of fog near the Grand Banks numbered 2 less than the average; between the 55th and 65th meridians 5 less than the average; and west of the 65th meridian 8 less than the average. On the dates for which fog was reported near the Grand Banks it occurred with the approach or passage of general storms, save on the 15th when high pressure and westerly winds prevailed. On the dates fog was reported west of the 55th meridian it occurred with the approach or passage to the northward of general storms. On the 4th, 5th, 6th, 12th, 14th, 16th, and 26th dense fog was reported at points along the Atlantic coast north of New Jersey by observers of the Signal Service, its occurrence attending the passage of general storms eastward from the Lake region.

OCEAN ICE IN SEPTEMBER.

The table shows that for September, 1890, ice was reported about 1° south and about ½° east of the average southern and eastern limits of ice for the month, as determined from reports of the last 7 years. The southernmost ice noted in the table for the current month, a large iceberg observed on the 30th in the position given, was over ½° farther south than the southernmost ice reported for September of preceding years, and the easternmost ice reported for the current month, 2 icebergs observed on the 8th in the position given, was about ½° east of the average eastern limit of ice for September. Ice was reported most frequently and in the greatest quantity in and east of the Straits of Belle Isle and along the east edge of the Banks of Newfoundland, and it exceeded the average amount reported for the corresponding month of previous years. The limits within which icebergs and field ice were reported for September, 1890, are shown on chart I by ruled shading.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for September during the last 8 years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
	° ′	° ′		° ′	° ′
September, 1883.....	48 25	47 10	September, 1883.....	49 01	44 33
September, 1884.....	46 06	53 21	September, 1884.....	47 39	49 14
September, 1885.....	45 40	48 22	September, 1885.....	48 40	46 27
September, 1886.....	46 40	53 00	September, 1886.....	48 00	48 40
September, 1887.....	45 37	40 50	September, 1887.....	45 37	40 50
September, 1888.....	Off Cape	Race.	September, 1888.....	53 00	52 08
September, 1889.....	46 21	48 22	September, 1889.....	48 59	46 48
September, 1890*.....	45 30	48 00	September, 1890*.....	50 30	46 22
Mean.....	46 30	47 58	Mean.....	48 42	46 57

*On the 4th a large lump of ice 100 feet long and 6 feet above water was reported in N. 36° 49′, W. 42° 18′; this is the lowest latitude in which ice was ever reported in the north Atlantic Ocean.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for September, 1890, is exhibited on chart II by dotted isotherms. In the table of Signal Service data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

The mean temperature was highest in the lower Colorado and lower Gila valleys, where it was above 85, and at stations in that region the mean value was above 90. The mean temperature was above 80 at Rio Grande City, Tex., and Key West, Fla. North of a line traced from the Va. coast irregularly westward to the southeast slope of the Rocky Mountains, thence southwest to the middle Rio Grande valley, and thence northwestward to the upper Sacramento valley, and east of this line continued southward inside the coast line to the Cal. coast in about latitude N. 34°, the mean temperature was above 70. The mean temperature was lowest at elevated stations in central Colo., at stations in the British Possessions north of Mont., N. Dak., and the Lake region, and in the lower Saint Lawrence valley, where it fell to or below 50.

The mean temperature was generally below the normal east of the Rocky Mountains, and on the Pacific coast between the 35th and 43d parallels and north of the 46th parallel. The month was warmer than the average September in eastern Me. and the Canadian Maritime Provinces, in N. C. and south Va., at Jacksonville, Fla., Rio Grande City, Tex., and over the plateau regions. The greatest departures below the normal temperature were noted in an area extending from the west part of the lower lake region to east Kans. and Ind. T., where they exceeded 4, and the most marked departures above the normal temperature were reported at stations in eastern Nova Scotia and New Brunswick, N. C., and Ariz., where they were 2, or more.

At stations in the middle and lower Mississippi and Red River valleys, and south Fla., the month was the coldest, and at Fort Apache, Ariz., it was the warmest September on record.

The warmest September east of the Rocky Mountains occurred in 1881, when the departures above the normal ranged above 8 in the lower lake region; between the Mississippi River and the Rocky Mountains and south of the Dakotas in 1884, when the excess in temperature was more than 5; and generally over the Rocky Mountain and plateau regions and on the Pacific coast in 1888, when the temperature was more than 5 above the normal over the northern plateau region and on the north Pacific coast. The coolest September in the middle Mississippi and Red River valleys, and at Key West, Fla., occurred in 1890, when the temperature was more than 4 below the normal in the first named regions and 2.7 below at Key West, Fla. In the Atlantic coast states from New York to Georgia the coldest September was that of 1871; in the middle Ohio valley and thence over the west part of the lower lake region in 1879, when the departures below the normal temperature were more than 4; in the extreme northwest in 1881, when the temperature was 4 to 5 lower than usual; and over the middle and northern plateau regions and on the middle Pacific coast in 1884, when the deficiency in temperature was 4 to 5. From the foregoing it will be seen that in 1881, when the month was the warmest on record east of the Mississippi River, it was the coldest September noted for the extreme northwest; and that in 1884, when it was the warmest September recorded for stations between the Mississippi River and the Rocky Mountains and south of the Dakotas, it was the coldest on record over the middle and northern plateau regions and on the north Pacific coast.

DEVIATIONS FROM NORMAL TEMPERATURE.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for September for a series of years; (2) the length of record during which the observations have been taken, and from which the normal